



1

SEQUENCE LISTING

<110> Cham, Bill E.

Maltais, Jo-Ann

<120> A Method of Treating and Preventing Infectious Diseases via Creation of a Modified Viral Particle with Immunogenic Properties

<130> 13131-0310 (44378-282108)

<140> US 10/601,656

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<150> US 10/311,679

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<150> US 60/390,066

<151> 2002-06-20

<160> 122

<170> PatentIn version 3.1

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Glu Lys Ile Arg Leu Arg  
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Lys Lys Ala Asp Glu Leu Glu Lys Ile Arg Leu Arg Pro Asn Gly Lys  
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Lys Lys Tyr Met Leu Lys  
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Leu Arg Pro Asn Gly Lys Lys Tyr Met Leu Lys His Val Val Trp  
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Ala Ala Asn Glu Leu Asp  
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Cys Gln Lys Ile Leu Ser  
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Ser Leu Tyr Asn Thr Val  
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Cys Ile His Ala Glu Glu  
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His Leu Val Val Glu Thr  
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Gly Thr Thr Ser Ser Val  
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Gln Trp Met Tyr Arg Gln  
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Ser Val Asp Glu Gln Ile Gln Trp Met Tyr Arg Gln Gln Asn Pro Ile  
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Pro Val Gly Asn Ile Tyr  
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Arg Gln Gln Asn Pro Ile Pro Val Gly Asn Ile Tyr Arg Arg Trp Ile  
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Gln Leu Gly Leu Gln Lys  
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Ile Tyr Arg Arg Trp Ile Gln Leu Gly Leu Gln Lys Cys Val Arg Met  
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Tyr Asn Pro Thr Asn Ile Leu  
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Lys Cys Val Arg Met Tyr Asn Pro Thr Asn Ile Leu Asp Val Lys Gln  
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Gly Pro Lys Glu Pro Phe  
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Asp Arg Phe Tyr Lys Ser  
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Pro Asp Cys Lys Leu Val  
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Gly Val Asn Pro Thr Leu  
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Gln Lys Ala Arg Leu Met  
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Gly Val Gly Gly Pro Gly Gln Lys Ala Arg Leu Met Ala Glu Ala Leu  
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Lys Glu Ala Leu Ala Pro  
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Leu Met Ala Glu Ala Leu Lys Glu Ala Leu Ala Pro Val Pro Ile Pro  
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Phe Ala Ala Ala Gln Gln  
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Lys Pro Ile Lys Cys Trp  
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Lys Glu Gly His Ser Ala  
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Lys Cys Trp Asn Cys Gly Lys Glu Gly His Ser Ala Arg Gln Cys Arg  
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Ala Pro Arg Arg Gln Gly  
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Ser Ala Arg Gln Cys Arg Ala Pro Arg Arg Gln Gly Cys Trp Lys Cys  
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Gly Lys Met Asp His Val  
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Arg Gln Gly Cys Trp Lys Cys Gly Lys Met Asp His Val Met Ala Lys  
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Cys Pro Asp Arg Gln Ala Gly  
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His Val Met Ala Lys Cys Pro Asp Arg Gln Ala Gly Phe Leu Gly Leu  
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Gly Pro Trp Gly Lys Lys  
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Pro Met Ala Gln Val His  
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Lys Lys Pro Arg Asn Phe Pro Met Ala Gln Val His Gln Gly Leu Met  
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Pro Thr Ala Pro Pro Glu  
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Val His Gln Gly Leu Met Pro Thr Ala Pro Pro Glu Asp Pro Ala Val  
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Asp Leu Leu Lys Asn Tyr  
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Pro Glu Asp Pro Ala Val Asp Leu Leu Lys Asn Tyr Met Gln Leu Gly  
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Lys Gln Gln Arg Glu Lys  
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Asn Tyr Met Gln Leu Gly Lys Gln Gln Arg Glu Lys Gln Arg Glu Ser  
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Arg Glu Lys Pro Tyr Lys  
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Glu Lys Gln Arg Glu Ser Arg Glu Lys Pro Tyr Lys Glu Val Thr Glu  
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Asp Leu Leu His Leu Asn  
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Tyr Lys Glu Val Thr Glu Asp Leu Leu His Leu Asn Ser Leu Phe Gly  
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Gly Asp Gln

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Met Gly Cys Leu Gly Asn Gln Leu Leu Ile Ala Ile Leu Leu Leu Ser  
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Val Tyr Gly Ile Tyr Cys Thr Leu Tyr  
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Leu Leu Leu Ser Val Tyr Gly Ile Tyr Cys Thr Leu Tyr Val Thr Val  
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Phe Tyr Gly Val Pro Ala Trp Arg Asn  
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Tyr Val Thr Val Phe Tyr Gly Val Pro Ala Trp Arg Asn Ala Thr Ile  
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Pro Leu Phe Cys Ala Thr Lys Asn Arg  
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Asn Ala Thr Ile Pro Leu Phe Cys Ala Thr Lys Asn Arg Asp Thr Trp  
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Gly Thr Thr Gln Cys Leu Pro Asp Asn  
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Arg Asp Thr Trp Gly Thr Thr Gln Cys Leu Pro Asp Asn Gly Asp Tyr  
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Ser Glu Val Ala Leu Asn Val Thr Glu  
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Asn Gly Asp Tyr Ser Glu Val Ala Leu Asn Val Thr Glu Ser Phe Asp  
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Ala Trp Asn Asn Thr Val Thr Glu Gln  
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Glu Ser Phe Asp Ala Trp Asn Asn Thr Val Thr Glu Gln Ala Ile Glu  
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Asp Val Trp Gln Leu Phe Glu Thr Ser  
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Gln Ala Ile Glu Asp Val Trp Gln Leu Phe Glu Thr Ser Ile Lys Pro  
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Cys Val Lys Leu Ser Pro Leu Cys Ile  
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Ser Ile Lys Pro Cys Val Lys Leu Ser Pro Leu Cys Ile Thr Met Arg  
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Cys Asn Lys Ser Glu Thr Asp Arg Trp  
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Thr Met Arg Cys Asn Lys Ser Glu Thr Asp Arg Trp Gly Leu Thr Lys  
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Ser Ile Thr Thr Thr Ala Ser Thr  
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Trp Gly Leu Thr Lys Ser Ile Thr Thr Thr Ala Ser Thr Thr Ser Thr  
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Thr Ala Ser Ala Lys Val Asp Met Val  
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Thr Thr Ser Thr Thr Ala Ser Ala Lys Val Asp Met Val Asn Glu Thr  
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Ser Ser Cys Ile Ala Gln Asp Asn Cys  
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Val Asn Glu Thr Ser Ser Cys Ile Ala Gln Asp Asn Cys Thr Gly Leu  
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Glu Gln Glu Gln Met Ile Ser Cys Lys  
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Cys Thr Gly Leu Glu Gln Glu Gln Met Ile Ser Cys Lys Phe Asn Met  
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Thr Gly Leu Lys Arg Asp Lys Lys Lys  
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Lys Phe Asn Met Thr Gly Leu Lys Arg Asp Lys Lys Lys Glu Tyr Asn  
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Glu Thr Trp Tyr Ser Ala Asp Leu Val  
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Lys Glu Tyr Asn Glu Thr Trp Tyr Ser Ala Asp Leu Val Cys Glu Gln  
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Gly Asn Asn Thr Gly Asn Glu Ser Arg  
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Val Cys Glu Gln Gly Asn Asn Thr Gly Asn Glu Ser Arg Cys Tyr Met  
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Asn His Cys Asn Thr Ser Val Ile Gln  
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Arg Cys Tyr Met Asn His Cys Asn Thr Ser Val Ile Gln Glu Ser Cys  
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Asp Lys His Tyr Trp Asp Ala Ile Arg  
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Gln Glu Ser Cys Asp Lys His Tyr Trp Asp Ala Ile Arg Phe Arg Tyr  
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Cys Ala Pro Pro Gly Tyr Ala Leu Leu  
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Arg Phe Arg Tyr Cys Ala Pro Pro Gly Tyr Ala Leu Leu Arg Cys Asn  
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Asp Thr Asn Tyr Ser Gly Phe Met Pro  
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Leu Arg Cys Asn Asp Thr Asn Tyr Ser Gly Phe Met Pro Lys Cys Ser  
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Lys Val Val Val Ser Ser Cys Thr Arg  
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Pro Lys Cys Ser Lys Val Val Val Ser Ser Cys Thr Arg Met Met Glu  
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Thr Gln Thr Ser Thr Trp Phe Gly Phe  
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Arg Met Met Glu Thr Gln Thr Ser Thr Trp Phe Gly Phe Asn Gly Thr  
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Arg Ala Glu Asn Arg Thr Tyr Ile Tyr  
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Phe Asn Gly Thr Arg Ala Glu Asn Arg Thr Tyr Ile Tyr Trp His Gly  
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Arg Asp Asn Arg Thr Ile Ile Ser Leu  
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Tyr Trp His Gly Arg Asp Asn Arg Thr Ile Ile Ser Leu Asn Lys Tyr  
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Tyr Asn Leu Thr Met Lys Cys Arg Arg  
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Leu Asn Lys Tyr Tyr Asn Leu Thr Met Lys Cys Arg Arg Pro Gly Asn  
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Lys Thr Val Leu Pro Val Thr Ile Met  
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Arg Pro Gly Asn Lys Thr Val Leu Pro Val Thr Ile Met Ser Gly Leu  
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Val Phe His Ser Gln Pro Ile Asn Asp  
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Met Ser Gly Leu Val Phe His Ser Gln Pro Ile Asn Asp Arg Pro Lys  
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Gln Ala Trp Cys Trp Phe Gly Gly Lys  
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Asp Arg Pro Lys Gln Ala Trp Cys Trp Phe Gly Gly Lys Trp Lys Asp  
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Ala Ile Lys Glu Val Lys Gln Thr Ile  
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Lys Trp Lys Asp Ala Ile Lys Glu Val Lys Gln Thr Ile Val Lys His  
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Pro Arg Tyr Thr Gly Thr Asn Asn Thr  
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Ile Val Lys His Pro Arg Tyr Thr Gly Thr Asn Asn Thr Asp Lys Ile  
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Asn Leu Thr Ala Pro Gly Gly Gly Asp  
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Thr Asp Lys Ile Asn Leu Thr Ala Pro Gly Gly Gly Asp Pro Glu Val  
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Thr Phe Met Trp Thr Asn Cys Arg Gly  
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Asp Pro Glu Val Thr Phe Met Trp Thr Asn Cys Arg Gly Glu Phe Leu  
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Tyr Cys Lys Met Asn Trp Phe Leu Asn  
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Gly Glu Phe Leu Tyr Cys Lys Met Asn Trp Phe Leu Asn Trp Val Glu  
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Asp Arg Asn Thr Ala Asn Gln Lys Pro  
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His Lys Arg Asn Tyr Val Pro Cys His  
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Pro Lys Glu Gln His Lys Arg Asn Tyr Val Pro Cys His Ile Arg Gln  
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Ile Ile Asn Thr Trp His Lys Val Gly  
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<223> Synthetic

<400> 87

His Ile Arg Gln Ile Ile Asn Thr Trp His Lys Val Gly Lys Asn Val  
1 5 10 15

Tyr Leu Pro Pro Arg Glu Gly Asp Leu  
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<210> 88

<211> 25

<212> PRT

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<400> 88

Gly Lys Asn Val Tyr Leu Pro Pro Arg Glu Gly Asp Leu Thr Cys Asn  
1 5 10 15

Ser Thr Val Thr Ser Leu Ile Ala Asn  
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<210> 89

<211> 25

<212> PRT

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<400> 89

Leu Thr Cys Asn Ser Thr Val Thr Ser Leu Ile Ala Asn Ile Asp Trp  
1 5 10 15

Ile Asp Gly Asn Gln Thr Asn Ile Thr  
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<210> 90

<211> 25

<212> PRT

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<400> 90

Asn Ile Asp Trp Ile Asp Gly Asn Gln Thr Asn Ile Thr Met Ser Ala  
1 5 10 15

Glu Val Ala Glu Leu Tyr Arg Leu Glu  
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<210> 91

<211> 25

<212> PRT

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<400> 91

Thr Met Ser Ala Glu Val Ala Glu Leu Tyr Arg Leu Glu Leu Gly Asp  
1 5 10 15

Tyr Lys Leu Val Glu Ile Thr Pro Ile  
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<210> 92

<211> 25

<212> PRT

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<400> 92

Glu Leu Gly Asp Tyr Lys Leu Val Glu Ile Thr Pro Ile Gly Leu Ala  
1 5 10 15

Pro Thr Asp Val Lys Arg Tyr Thr Thr  
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<210> 93

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<400> 93

Ile Gly Leu Ala Pro Thr Asp Val Lys Arg Tyr Thr Thr Gly Gly Thr  
1 5 10 15

Ser Arg Asn Lys Arg Gly Val Phe Val  
20 25

<210> 94  
<211> 25  
<212> PRT  
<213> Artificial Sequence

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<400> 94

Thr Gly Gly Thr Ser Arg Asn Lys Arg Gly Val Phe Val Leu Gly Phe  
1 5 10 15

Leu Gly Phe Leu Ala Thr Ala Gly Ser  
20 25

<210> 95  
<211> 25  
<212> PRT  
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<220>

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<400> 95

Val Leu Gly Phe Leu Gly Phe Leu Ala Thr Ala Gly Ser Ala Met Gly  
1 5 10 15

Ala Ala Ser Leu Thr Leu Thr Ala Gln  
20 25

<210> 96

<211> 25

<212> PRT

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<220>

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<400> 96

Ser Ala Met Gly Ala Ala Ser Leu Thr Leu Thr Ala Gln Ser Arg Thr  
1 5 10 15

Leu Leu Ala Gly Ile Val Gln Gln Gln  
20 25

<210> 97

<211> 25

<212> PRT

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<220>

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<400> 97

Gln Ser Arg Thr Leu Leu Ala Gly Ile Val Gln Gln Gln Gln Gln Leu  
1 5 10 15

Leu Asp Val Val Lys Arg Gln Gln Glu  
20 25

<210> 98

<211> 25

<212> PRT

<213> Artificial Sequence

<220>

<223> Synthetic

<400> 98

Gln Gln Gln Leu Leu Asp Val Val Lys Arg Gln Gln Glu Leu Leu Arg  
1 5 10 15

Leu Thr Val Trp Gly Thr Lys Asn Leu  
20 25

<210> 99

<211> 25

<212> PRT

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<220>

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<400> 99

Glu Leu Leu Arg Leu Thr Val Trp Gly Thr Lys Asn Leu Gln Thr Arg  
1 5 10 15

Val Thr Ala Ile Glu Lys Tyr Leu Lys  
20 25

<210> 100

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<212> PRT

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<220>

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<400> 100

Leu Gln Thr Arg Val Thr Ala Ile Glu Lys Tyr Leu Lys Asp Gln Ala  
1 5 10 15

Gln Leu Asn Ala Trp Gly Cys Ala Phe  
20 25

<210> 101

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<212> PRT

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<220>

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<400> 101

Lys Asp Gln Ala Gln Leu Asn Ala Trp Gly Cys Ala Phe Arg Gln Val  
1 5 10 15

Cys His Thr Thr Val Pro Trp Pro Asn  
20 25

<210> 102

<211> 25  
<212> PRT  
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<220>  
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<400> 102

Phe Arg Gln Val Cys His Thr Thr Val Pro Trp Pro Asn Ala Ser Leu  
1 5 10 15

Thr Pro Lys Trp Asn Asn Glu Thr Trp  
20 25

<210> 103  
<211> 25  
<212> PRT  
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<220>  
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<400> 103

Asn Ala Ser Leu Thr Pro Lys Trp Asn Asn Glu Thr Trp Gln Glu Trp  
1 5 10 15

Glu Arg Lys Val Asp Phe Leu Glu Glu  
20 25

<210> 104  
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<212> PRT  
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<220>

<223> Synthetic

<400> 104

Trp Gln Glu Trp Glu Arg Lys Val Asp Phe Leu Glu Glu Asn Ile Thr  
1 5 10 15

Ala Leu Leu Glu Glu Ala Gln Ile Gln  
20 25

<210> 105

<211> 25

<212> PRT

<213> Artificial Sequence

<220>

<223> Synthetic

<400> 105

Glu Asn Ile Thr Ala Leu Leu Glu Glu Ala Gln Ile Gln Gln Glu Lys  
1 5 10 15

Asn Met Tyr Glu Leu Gln Lys Leu Asn  
20 25

<210> 106

<211> 25

<212> PRT

<213> Artificial Sequence

<220>

<223> Synthetic

<400> 106

Gln Gln Glu Lys Asn Met Tyr Glu Leu Gln Lys Leu Asn Ser Trp Asp  
1 5 10 15

Val Phe Gly Asn Trp Phe Asp Leu Ala  
20 25

<210> 107

<211> 25

<212> PRT

<213> Artificial Sequence

<220>

<223> Synthetic

<400> 107

Asn Ser Trp Asp Val Phe Gly Asn Trp Phe Asp Leu Ala Ser Trp Ile  
1 5 10 15

Lys Tyr Ile Gln Tyr Gly Val Tyr Ile  
20 25

<210> 108

<211> 25

<212> PRT

<213> Artificial Sequence

<220>

<223> Synthetic

<400> 108

Ala Ser Trp Ile Lys Tyr Ile Gln Tyr Gly Val Tyr Ile Val Val Gly  
1 5 10 15

Val Ile Leu Leu Arg Ile Val Ile Tyr  
20 25

<210> 109

<211> 25

<212> PRT

<213> Artificial Sequence

<220>

<223> Synthetic

<400> 109

Ile Val Val Gly Val Ile Leu Leu Arg Ile Val Ile Tyr Ile Val Gln  
1 5 10 15

Met Leu Ala Lys Leu Arg Gln Gly Tyr  
20 25

<210> 110

<211> 25

<212> PRT

<213> Artificial Sequence

<220>

<223> Synthetic

<400> 110

Tyr Ile Val Gln Met Leu Ala Lys Leu Arg Gln Gly Tyr Arg Pro Val  
1 5 10 15

Phe Ser Ser Pro Pro Ser Tyr Phe Gln  
20 25

<210> 111

<211> 25  
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<220>  
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<400> 111

Tyr Arg Pro Val Phe Ser Ser Pro Pro Ser Tyr Phe Gln Gln Thr His  
1 5 10 15

Ile Gln Gln Asp Pro Ala Leu Pro Thr  
20 25

<210> 112  
<211> 25  
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<220>  
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<400> 112

Gln Gln Thr His Ile Gln Gln Asp Pro Ala Leu Pro Thr Arg Glu Gly  
1 5 10 15

Lys Glu Arg Asp Gly Gly Glu Gly  
20 25

<210> 113  
<211> 25  
<212> PRT  
<213> Artificial Sequence

<220>

<223> Synthetic

<400> 113

Thr Arg Glu Gly Lys Glu Arg Asp Gly Gly Glu Gly Gly Asn Ser  
1 5 10 15

Ser Trp Pro Trp Gln Ile Glu Tyr Ile  
20 25

<210> 114

<211> 25

<212> PRT

<213> Artificial Sequence

<220>

<223> Synthetic

<400> 114

Gly Gly Asn Ser Ser Trp Pro Trp Gln Ile Glu Tyr Ile His Phe Leu  
1 5 10 15

Ile Arg Gln Leu Ile Arg Leu Leu Thr  
20 25

<210> 115

<211> 25

<212> PRT

<213> Artificial Sequence

<220>

<223> Synthetic

<400> 115

Ile His Phe Leu Ile Arg Gln Leu Ile Arg Leu Leu Thr Trp Leu Phe  
1 5 10 15

Ser Asn Cys Arg Thr Leu Leu Ser Arg  
20 25

<210> 116

<211> 25

<212> PRT

<213> Artificial Sequence

<220>

<223> Synthetic

<400> 116

Thr Trp Leu Phe Ser Asn Cys Arg Thr Leu Leu Ser Arg Val Tyr Gln  
1 5 10 15

Ile Leu Gln Pro Ile Leu Gln Arg Leu  
20 25

<210> 117

<211> 25

<212> PRT

<213> Artificial Sequence

<220>

<223> Synthetic

<400> 117

Arg Val Tyr Gln Ile Leu Gln Pro Ile Leu Gln Arg Leu Ser Ala Thr  
1 5 10 15

Leu Gln Arg Ile Arg Glu Val Leu Arg  
20 25

<210> 118

<211> 25

<212> PRT

<213> Artificial Sequence

<220>

<223> Synthetic

<400> 118

Leu Ser Ala Thr Leu Gln Arg Ile Arg Glu Val Leu Arg Thr Glu Leu  
1 5 10 15

Thr Tyr Leu Gln Tyr Gly Trp Ser Tyr  
20 25

<210> 119

<211> 25

<212> PRT

<213> Artificial Sequence

<220>

<223> Synthetic

<400> 119

Arg Thr Glu Leu Thr Tyr Leu Gln Tyr Gly Trp Ser Tyr Phe His Glu  
1 5 10 15

Ala Val Gln Ala Val Trp Arg Ser Ala  
20 25

<210> 120

<211> 25  
<212> PRT  
<213> Artificial Sequence

<220>  
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<400> 120

Tyr Phe His Glu Ala Val Gln Ala Val Trp Arg Ser Ala Thr Glu Thr  
1 5 10 15

Leu Ala Gly Ala Trp Gly Asp Leu Trp  
20 25

<210> 121  
<211> 25  
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<213> Artificial Sequence

<220>  
<223> Synthetic  
<400> 121

Ala Thr Glu Thr Leu Ala Gly Ala Trp Gly Asp Leu Trp Glu Thr Leu  
1 5 10 15

Arg Arg Gly Gly Arg Trp Ile Leu Ala  
20 25

<210> 122  
<211> 27  
<212> PRT  
<213> Artificial Sequence

<220>

<223> Synthetic

<400> 122

Trp Glu Thr Leu Arg Arg Gly Gly Arg Trp Ile Leu Ala Ile Pro Arg  
1 5 10 15

Arg Ile Arg Gln Gly Leu Glu Leu Thr Leu Leu  
20 25